THE SNAILS OF NEW MEXICO AND ARIZONA.

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Mollusca of the Southwestern States. 1. Urocoptidæ; Helicidæ of Arizona and New Mexico. By H. A. Pilsbry. (Proc. Acad. Nat. Sci., Phila., March, 1905.)

Several years ago I was walking at night in the streets of Albuquerque, N. M., looking for a building where a certain meeting was to be held. Accosting the first person I met, I asked the way. The stranger at once said that he was going to the same meeting, and we walked together. I do not know how it was, but through some inevitable necessity, the conversation soon led up to snails. My companion was from the Pacific coast; his name was Ashmun; he was interested in snails; did I suppose he could find any in New Mexico? Thus I had run across the only person in New Mexico, except myself, who cared anything about the mollusca. The information I gave him was not particularly encouraging; he was not likely to find much, but there were some little *Pupidæ* and other miscellanea in the debris on the banks of the Rio Grande.

The next time I met Mr. Ashmun was in the train between Las Cruces and Albuquerque. His first remark was, "I have found three new *Polygyras!*" I well remember my almost incredulous astonishment; I thought I knew there were no such things in that region; for even the Santa Fé Cañon records had become semi-mythical in the absence of recent confirmation.

Thus the corner of the veil was lifted; but how little we then realized that Arizona and New Mexico contained a whole new snail-fauna, including new genera of many species, large and varied in form! Fifteen years ago, the man who should have predicted the discovery of a very distinct genus of comparative large snails, with 26 different species and subspecies, within the borders of New Mexico and Arizona, would have been considered a veritable Munchausen; to-day we are prepared for almost anything, and humbly confess that we scarcely begin to know the fauna of the Southwest.

Astonishing as Mr. Ashmun's discoveries were, it remained for Mr. J. H. Ferriss to reveal even more wonderful forms. In 1902 and again in 1904, he visited the Chiricahua and Huachuca mountains in southern Arizona. The results of these journeys, together with the accumulated fruits of other investigations, are presented by

Dr. Pilsbry in the paper before us, so far as they relate to the *Urocoptidæ* and *Helicidæ*. A second paper, on the small species, is to appear later.

The paper is full of detail and profusely illustrated, so that it practically covers the ground, so far as present knowledge will permit. It has the lucidity and precision which we have learned to expect in Dr. Pilsbry's writings, presenting the facts in such a manner that the reader can judge for himself, whether he will agree with the conclusions reached or not.

In the *Urocoptidæ*, the genera *Holospira* and *Microceramus* are described. The latter includes *M. texanus* (Pils.), of Texas, but does not enter New Mexico or Arizona. *Holospira* has a species confined to Texas, one common to Texas and adjacent New Mexico, five apparently peculiar to New Mexico, and four only known from Arizona. They seem to be often confined to a single range, two species being sometimes found living together. Four new ones are described: *H. ferrissi* from the Huachuca Mts., *H. cionella* from Fort Bowie, Ariz., *H. regis* Pils. and Ckll., from near Kingston, N. M., and *H. chiricahuana* from the Chiricahua Mts.

The Helicidæ of Arizona and New Mexico include five genera: *Ashmunella*, *Sonorella*, *Oreohelix*, *Polygyra* and *Thysanophora*. The last is to be treated later on, and *Polygyra* is dismissed with the remark that it just enters New Mexico, one species—*P. texasiana*—having been found in the Pecos Valley. It is worth while to note here that these Polygyras were collected by Professor Tinsley, who subsequently took me to the locality where they occur. They exist exclusively, so far as I could learn, in a bed of white marl close to the Pecos river, and they are to be regarded as pleistocene fossils. It is quite probable that *Polygyra* has been long extinct in New Mexico; but if it still survives there the fact remains to be discovered. The fossil shell is probably worthy of a subspecific name, as it is not typical *texasiana*.

Incidentally, one may be excused for remarking that the pleistocene beds of the southwest urgently need investigation. They are abundant in New Mexico, at least, and there is no doubt that they will throw much light on the past history of the snails of that region. Unfortunately, it is usually impossible to form any good estimate of their age, for shells are well preserved in the dry soil, and specimens ten thousand years old may not look materially different from

weathered shells which flourished ten years ago. When mammalian remains can be found with the shells, of course they afford valuable clues.

The account of *Ashmunella* begins with an interesting general discussion occupying four pages, in the course of which it is argued, apparently on valid grounds, that the ancestor of all the forms had a tridentate aperture. It is to be noted that this is the case with *A. thomsoniana pecosensis*, the most ancient form yet known. The toothless forms have arisen independently in several localities, and have come to resemble each other so much that they are only separated readily by those intimately acquainted with the genus, or in some cases by the aid of the anatomy. In this connection I may note that I once found at Pecos, N. M., a toothless shell which was plainly an individual variation of the *thomsoniana* series; but anyone could have taken it for *A. ashmuni*. Recalling this specimen, and more particularly on geographical grounds, I will venture to prophesy that when the anatomy of *A. ashmuni* becomes known, it will be seen to be related to the *thomsoniana* series, rather than to the *rhyssa* series, where Dr. Pilsbry provisionally places it.

The classification of the *Ashmunellas* is as follows:

(1.) Group of A. rhyssa. *A. rhyssa; rhyssa miorhyssa; r. hyporhyssa; r. townsendi; altissima; pseudodonta; p. capitanensis; ashmuni*; *a. robusta* (new name = the so-called *chiricahuana* of the Jemez Mts.).

(2.) Group of A. thomsoniana. *A. thomsoniana; t. porteræ; t. pecosensis*—the last a fossil.

(3.) Group of A. levettei. *A. levettei; l. angigyra* (new); *l. heterodonta* (new; extraordinarily variable); *l. proxima* (new); *fissidens* (new); *duplicidens* (new); *angulata* (new); *ferrissi* (new, most extraordinary, acutely carinate, with the keel continued up the spire, projecting above the sutures); *walkeri; mearnsi.*

(4.) Group of A. esuritor. *A. esuritor* (new; aperture toothless, anatomy peculiar).

(5.) Group of A. chiricahuana. *A. chiricahuana; c. mogollonensis* (new).

(6.) Group of A. metamorphosa. *A. metamorphosa* (new; shell like *chiricahuana*, anatomy quite different.)

The account of *Sonorella* is not so exhaustive, because the genus has so recently been treated in detail by Mr. Bartsch. The follow-

ing are proposed as new: *S. hachitana bowiensis*, *S. granulatissima parva*, *S. g. latior*, *S. virilis* (looks like a variety of *hachitana*, but anatomy peculiar), *S. v. circumstriata*, *S. v. huachucana*.

Oreohelix is carefully defined, but only the species of Arizona and New Mexico are treated, and not even all of those. The very variable series grouped under *O. strigosa huachucana* is fully described and illustrated. The new forms are *O. strigosa socorroensis* (allied to *metcalfei*), *O. barbata* (very remarkable, the adult with an epidermal fringe), *O. yavapai*, *O. y. neomexicana* (this species and subspecies separated mainly on the anatomy; the *neomexicana* has been reported heretofore as *hemphilli*, which it much resembles), and *O. chiricahuana*. The last, along with *O. clappi* Ferriss and *O. avalonensis* Hemphill, goes in a new subgenus, named *Radiocentrum*, distinct by the smaller number and the sculpture of the embryonic whorls, and the somewhat modified genitalia.

I wish to call attention to a few apparent peculiarities of distribution, which should be confirmed or disproved by future observers:

(1.) On the east side of the Rio Grande, *Oreohelix* appears to get no further south than the Sandia Mountains. It is totally unknown in the Organs, Sierra Blanca, etc. On the west side of the river it goes nearly to the Mexican boundary, at least.

(2.) *Sonorella* gets as far east as the Organ Mts., but I have not seen it from Sierra Blanca or the Sacramentos; nor does it seem to range northward even as far as the Sandias.

(3.) The Organ Mts. mark the eastern limit of the *levettei* group of *Ashmunella*, the species found there being *mearnsi*. One has only to cross the valley to the Sacramentos to meet with the very different *rhyssa* series.

PUBLICATIONS RECEIVED.

Antarctic Nudibranchs.—Sir Charles Eliot has just published in the Transactions of the Royal Society of Edinburgh a very interesting paper on the Nudibranchiata of the Scottish National Antarctic Expedition. In the preface he remarks on the absence or extreme rarity of Dorids in the Antarctic, while in the tropics Dorids are greatly more abundant than Aeolids. This seems the more singular from the fact that the Dorids are tough and well-protected animals for the most part, while the Aeolids would seem too delicate for the stormy and cold seas (often below 30° Fahr.) of the extreme